

May 4, 1929

A McGraw-Hill Publication

20 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine



SPECIAL FEATURES

AN ANALYSIS OF *Aircraft Accidents* DURING 1928

A RECORDER FOR TESTING *Shock Absorbers*

THE *Eastman* FLYING BOAT

"ALCLAD"

ALLOY
MAKES
FORD
PLANES
PROOF
AGAINST
CORROSION



THE all-metal feature of the Ford plane has always presented many well understood advantages over other materials. Both from the standpoint of low upkeep expense and long life, metal offers economy and security in no less from fire, icing, warping, shifting, settling—in its treatment is sure and reliable—its definitely determined strength—in its wearing good appearance.

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A small, sturdy ship, the Argo. Capable of any maneuver—naturally alert and responsive to the throttle's urge. Cruise at 100 miles per hour—40 more if you wish. The efficient performance of plane and engine more than prove the theory, "built together, work together."

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THE FAIRCHILD "Ti" zero-plus cabin biplane for transport. Load and structural test: 4,000 lbs. gross weight. Cruise speed 110 m.p.h. in the "Wasp" engine plane of its kind. Flying speed 110 m.p.h. in the "Wasp" engine plane of its kind. Flying speed 110 m.p.h. in the "Wasp" engine plane of its kind. Flying speed 110 m.p.h. in the "Wasp" engine plane of its kind.

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December 25, 1937.

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ATTENTION: AVIATION DIVISION

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AVIATION
May 4, 1938



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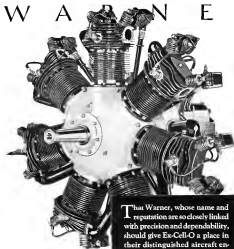
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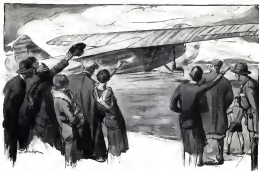
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GARDEN CITY, NEW YORK

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

May 4, 1929

Volume 11, Number 18



Mounting Instruments Correctly

EXCEPT FOR flying in clear weather and over known territory, a good compass may be said to be about as vital to aviators as a good engine. And yet we recently found a case where neither the plane builder nor the pilot seemed to appreciate this simple fact.

They had managed to reach the Shore at Detroit by a combination of good weather and good luck, and with least complaints against the compass they had mounted in the first available place just before leaving.

Investigation revealed the fact that they had not only disregarded the printed notice attached to the compass to the effect that it must be compensated after being placed in position, but they had mounted the compass almost directly over the magnets. The alibi was that they had to put instruments wherever they had room and couldn't bother to consider them until the plane was completed.

Naturally to say that was not an experienced plane builder nor was the pilot versed in modern flying practice. Successful builders have learned to give careful consideration to instrument location in order to permit them to function properly as well as to have them easily visible to the pilot. It is difficult to over-emphasize the importance of instruments in air transport and neither builder nor pilot can afford to be careless as to their location or calibration.

//

"Amphibian" or "Amphibian"?

"WERE PERFECTLY RIGHT about our spelling the word "amphibian," declared Harry White, of the Sikorsky company, recently.

"If you don't believe it, look it up in the dictionary." Well, we did look it up and have to report that Plunk & Wigwags is behind Mr. White with—"Amphibian." An airplane so built that it can rise from or alight on either land or water.

True, White doesn't touch on the water. That old story—being given only—"Amphibian." Living both on land and in water; an animal or plant accustomed to life both

on land and in the water." Agreeing in the common definition with—"Amphibian." Living both on land and water, suited to an amphibious land and water—"Plunk & Wigwags" has gone further and given the aviation industry a word of its own which will not be shared with the biologists—with the frogs and salamanders—hence we're all in favor of it. From now on it's "amphibian."

//

Pirating Labor

THOSE WHO HAVE known other industries and even those who know the aeronautical industry of 1922 and 1923 realize that there has been a very considerable amount of helpful co-operation among the aeronautical manufacturers. Even during these times of great expansion most of them have maintained a fairly gentlemanly attitude about working up the labor of other shops by paying higher wages. However, among some of the newer factories that have been springing up, this has not been the case and pirating of labor has had to reach record.

There can be little argument in favor of stealing and scoundrels to break away the most skilled laborers of other organizations. This practice is, in the long run, detrimental to both of the manufacturers, and it is possible, and almost necessary, for plant managers to refuse from taking employees who are working for another aeronautical company.

The matter of taking executives and engineers from other organizations is much more open to discussion. There must be a certain amount of exchanging of executive personnel in order to satisfy individual ambitions. There have, though, the obtaining of personnel by the simple expedient of offering a higher salary should be discouraged. The change should be made because the new position offers better opportunities or more congenial and interesting work. This matter is not one in which salary sells can be referred but it is a matter which can be handled in such a way as to make this industry a much more pleasant one with which to be connected.

THE NEW TRAINING COURSE

By JAMES P. WINES

Naval Reserve

FOR

Aviators

STUDENT NAVAL AVIATORS in the U. S. Naval Reserve hospitals will receive the same training as that given aviator pilots in the regular Navy according to a new plan formulated by the Bureau of Aeronautics and the Bureau of Steamships, which is soon to be placed in effect.

Under the new scheme of things, the training course, exclusive of the preliminary ground school work, will require that the student remain on active duty for a period of nine months with the possibility that he may be called to serve an additional year as a member of one of the operating units in either the battle fleet or the scouting fleet.

As inferred from the policy of the Army Air Corps, those who complete the reserve training course will not be allowed an opportunity of clearing commissions in the regular Navy. Naval aviators and naval aviation pilots in the regulars are selected from the officer and enlisted personnel of the permanent establishment. The purpose of training reserve aviators is simply to provide officers to fill authorized vacancies in the squadrons and divisions of the various branches of the fleet and reserve as a means of promoting efficiency.

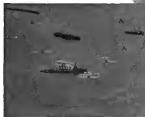
While one of the Navy's training hospitals takes off "before" a candidate at midday, while the training hospital "back in history" on the island, they the "history" hour.



systems for general service with the Navy is now of use.

While the course gives student naval aviators in the reserve has been quite complex, heretofore, the training period has run less of sufficient length for the students to obtain enough time in the air to really qualify them in handling both training and advanced types of planes under all operating conditions. The graduates were well founded in flying, but they lacked the experience which can be gained only by hours in the air.

Formerly, the successful student, upon graduation, was commissioned ensign in the fleet reserve and were assigned to squadrons and divisions. After that, made



Above: Inspecting a biplane observation plane from the quarters of the U. S. S. "Albatross." Left: A student of the Naval Reserve hospital in formation over the bay at San Diego, Calif.

Of course, the purpose in sending the reserves to sea was not just to give them more flight time. Had that been the idea, arrangements undoubtedly could have been made to send three or four of the Naval Air Squadrons where they would have been able to fly day in and day out. In the training course, however, the reserves had seen the workings of the land establishments, and the purpose was to give them sea duty in order to round out their experience so that in time of war they would be qualified for almost any position. Yet, if they had had more time in the air, the experience would have been more valuable.

Under the new plan for the training of reserve aviators there will be no difficulties in the way of lack of experience. Upon graduation from the flight school every reserve will have well over 250 hr. in the air to his credit. Those that are selected to serve a year with one of the fleets will receive from 125 to 200 hr. more flight time. Putting 250 hr. as a minimum, the training would cost in the neighborhood of \$5,000 for each student if an attempt were made to duplicate it at a conventional school. Although the Navy Brown difficulty in the participation of its reserve aviators in conventional flying, it is reasonable to suspect that many who complete the course will make use of their training conservatively.

With the initiation of the new plan the training course will be divided into four major parts. The first is the preliminary ground school work, which will be conducted at various universities and colleges throughout the country as in the past. At present, this ground training consists of 81 hr. of instruction. However, the syllabus is now undergoing change and it is expected that the course will be greatly enlarged in scope. Some of the work is conducted by the universities and colleges

from the flight time obtained during the usual 85 day active duty period performed by those in the fleet reserve, the only means of obtaining more hours in the air was by visiting one of the four naval reserve aviation bases at a Sunday or Sunday afternoon. This system did not allow the reserve aviators to "pile up" the great amount of time that they needed, although it would have been sufficient for an experienced aviator to maintain efficiency.

THE FACT that they lacked experience was clearly demonstrated when the Navy Department ordered the first group of 50 reserve aviators who had been commissioned since the course was inaugurated in 1922, to report for a 12 months' tour of duty with the scouting and battle fleets. This was July 1, 1927. While most of the older officers were better qualified than the younger men, because they had had an opportunity of doing more flying, all of them would admit that before they could hope to assume real positions in the various operating units to which they were sent. As much experience as possible was given the reserves, but neither the scouting fleet nor the battle fleet are aviation training schools and it is easy to see the reserves found themselves relegated to second pilot positions.

as a part of the regular curriculum, it is open to all who can qualify under the rules of the individual schools.

The second phase of the reserve training is for the purpose of eliminating those not suited for aviation. From the group that successfully completes the ground school course, those who can meet the aerial require-



Flight phase of a "Wave" reserved. Reserve F-10-B Spitzer

ments will be selected and enlisted in the reserve. They then will be ordered to 30 days' active duty at one of the naval reserve aviation bases, where they are to receive their first flight instruction. This is all probability will consist of two flights of three-quarters of an hour each to give the students the "feel of the air", five hours' dual instruction in soaring, take-offs, climbs, straight flying, glides, turns and full stall landings; four hours' dual instruction on emergency landings from various positions; half-hour to landings from 500 ft. and quarter spins to landings from an altitude of 250 ft.; and one hour's instruction on tail spins.

There is no specified time for the solo check. This may be given at any time up to the eleven and one-half hour mark. If at that time the student fails to qualify, he may be given additional instruction up to a maximum of five hours. A second check will be given him at the end of the additional five-hour period, at which time if the instructor believes the student is ready to solo. Similar flight training is given the aviators in the regular Navy to determine their fitness for the aviation branch of the service, but the regulars are not allowed to solo. The present plan is to give the reserves a test of engine hours in the air, preventing them to solo after passing the check and they have reached the eighteen hour mark but this may be changed before the plan is finally placed in operation. In addition to the flight training, the reserves will receive their previous ground school work and will study practical flying and radio.

Navy Department officials believe from past experience that about 50 per cent of those who take the nine-month training will fail. The remainder will enter the third phase of the course, which consists of primary and advanced flight training and also further ground school work at the Naval Air Station, Pensacola, Fla.

There, the reserve students will enter the mandatory flight and ground classes conducted for both officers and enlisted men of the regular Navy. Besides this, the reserves will be given other technical schooling to prepare them for the professional examinations which they must pass before they are commissioned officers.

It is to be expected that a number of the reserves will be "washed out" in the primary and advanced training. Those that do successfully complete it, however, will be commissioned ensigns in the volunteer naval reserve after passing the professional examinations. Of the group none, and perhaps all, will be ordered to a year's active duty with the aircraft squadrons of the two major fleets. This tour of duty is the fourth phase of the training. Upon its completion, the reserve aviators will be transferred to inactive duty, when they may be appointed to fill vacancies in the squadrons of first reserve. In the capacity of first reserve officers, they will perform weekly drills, for which each will receive one day's leave pay. They will also be granted the privilege of performing the annual 15-day active duty period, for which each officer receives the full pay and allowances of his rank and grade. In the active duty period and by performing the weekly drills, the aviator officers will obtain at least 45 hr. in the air each year, which should be sufficient to maintain efficiency.

While the requirements for entering the reserve training course are much the same as formerly, some slight changes in accordance with the new training program have been made. One is that the prospective student enlistment must have finished his university training, or that he must be a senior at the school in which he enters the ground school course. An equivalent education is acceptable only if it will meet with the requirements of the local university. This stipulation is made so that the student's college career will not be interrupted.



A Grounded Wave landing plane in a bank

and so that the ground school work, the flight training and the year's duty may all follow in perfect sequence. Another requirement is that the student must certify his willingness to maintain an active duty for a total of 20 months. Students who have completed the ground school course, besides being eligible for the naval reserve training, are eligible for training with a view to obtaining commissions as naval lieutenants and deep-sea divers at naval stations in the Marine Corps Reserve.

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AN ANALYSIS OF *Aircraft Accidents* DURING 1928

By EDWARD P. HOWARD

Chief Engineer, Bureau of Aeronautics
Department of Commerce

AN ANALYSIS and tabulation of aircraft accidents—no matter how minor the accident—of vital interest to the Aeronautics Branch, Department of Commerce. Through a detailed study of these accidents gratifying progress is being attained toward accurately determining their causes and preventing, to a great extent, their recurrence.

Pursuant to a resolution, adopted by the Executive Committee of the National Advisory Committee for Aeronautics on March 1, 1928, a special sub-committee was formed to study the accidents, tabulate and classify them, and make recommendations for their prevention. The committee was composed of members from the National Advisory Committee for Aeronautics, the Army Air Corps, the Navy Bureau of Aeronautics and the Aeronautics Branch of the Department of Commerce. It was recognized at the outset that no uniform definitions or adequate methods of analysis of aircraft accidents could be derived from which comparative figures could be derived. The Committee set about to remedy this condition and after its organization was completed in its report—*Aircraft Accidents (Method of Analysis)* Report No. 308, National Advisory Committee for Aeronautics, which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for ten cents a copy.

Before the meetings of the Committee were concluded it was very apparent to the representatives of the Department of Commerce that the system of accident analysis being devised would be of incalculable benefit to the Regulations Division of the Aeronautics Branch of the Department in determining exactly wherein the existing methods of regulating aeronautics required revision in order to make them more effective than at being a means for determining just why aircraft accidents were occurring the very way also pointed toward preventing recurrence. With this idea in mind, a

Special Section and an Accident Board were formed within the Regulations Division, and the work of analyzing accidents for the first half of 1928 according to the National Advisory Committee's method was begun.

When an accident occurs, the nearest inspector in the field proceeds to the scene with the least possible delay to collect all available information on the accident, including the testimony of witnesses. He renders his report with a reconstruction of the events leading up to the accident as far as possible based upon the evidence obtainable. This information is forwarded to Washington where the case is completed and prepared for submission to the Accident Board. This Board consists of two thoroughly competent pilots an aeronautical engineer, a flight surgeon, a lawyer named in the law, and a stenographer. It can be seen that all factors contributory to an accident are covered by expert knowledge.

Two main reasons for accident according to the preliminary analysis of aviation factors. It is obvious that an aircraft accident can be very rarely be directly attributed to a single cause. For instance, it may be reported that an airplane has taken off from a field and attained a 150 ft. altitude when the engine stops. The pilot, attempting to turn back into the field, goes into a spin two days to the ground for recovery and a crash results. The question is whether the original cause of the crash was engine failure or a spin resulting from poor technique on the part of the pilot—because of his inability to successfully negotiate the turn—or poor judgment because of his attempt to turn. Many detailed histories revealing the case must be obtained before a satisfactory conclusion as to the cause can be reached. If the pilot could have landed straight ahead the engine would be actually blamed for the crash, the poor judgment may be given some weight that if he were facing an impossible altitude and must necessarily turn. So, before the Board receives the case, it is made as com-

THE PROPOSED *Flying School* RULES AND REGULATIONS

THE FOLLOWING are the new flying school regulations drawn up by the Aeronautics Branch, Department of Commerce, which will be promulgated on or about May 15. These regulations have been drawn up to meet the urgent demand for the Civil Aeronautics Act of 1926 which provides for the rating of Aerobial flying schools.

Sec. 1. School Rating, Law of.

"The Secretary of Commerce shall by regulation * * * provide for the examination and rating of civil aviation schools giving instruction in flying, so as to the adequacy of the nature of instruction, as to the suitability and surroundings of the equipment, and as to the competency of the instructors. The examination and ratings provided for in this paragraph shall only be made upon request of the owners or representatives of the air navigation facilities at schools."

Sec. 2. Classification and Rating

A. Classification: Schools giving instruction in flying will be classed as (1) Private Pilot Schools and (2) Ground Schools. B. Approved Private Pilot Schools shall be rated as: (1) Private Pilot's Flying School. (2) Limited Commercial Pilot's Flying School. (3) Transport Pilot's Flying School. C. Approved Ground Schools shall be rated as: (1) Private Pilot's Ground School. (2) Limited Commercial Pilot's Ground School. (3) Transport Pilot's Ground School.

Sec. 3. Approved School Certificate

A. Application and Issuance: An individual, partnership or corporation engaged in giving instruction in flying, either to a ground school or as a flying school, or a combination of ground and flying, may at the option of the owner or agency file with the Secretary of Commerce an application under such law as approved school certificate.

Upon receipt of an application from a school for such certificate the Secretary of Commerce shall cause the school to be inspected as to the adequacy of the nature of instruction, as to the suitability and surroundings of the equipment, and as to the competency of the instructors. If, following inspection, approval is granted, the school may be issued a certificate authorizing it to operate in accordance with the regulations, privileges and restrictions set forth in these regulations.

B. Duration and Renewal: This certificate shall remain in force for one year from date of issuance unless sooner suspended or revoked by the Secretary of Commerce. It shall be renewed upon satisfactory evidence that the school is in active operation and its inspection satisfactory to an authorized representative of the Department of Commerce showing that the school is maintaining the required standards.

C. Continuous Inspection: Schools holding approved school certificates may be inspected by the Department of Commerce at any time and the school shall make its facilities available for such inspection at the discretion of the Department of Commerce, to assure the maintenance of the required standards.

D. Re-application: A school which has been discontinued for an approved school certificate may re-apply for such rating at any time after the expiration of 90 days from the date of such discontinuation.

E. Advertising: The school will be privileged to advertise its standing as an approved school but all advertising must be based strictly upon facts. F. The school shall keep a copy of these regulations conspicuously posted in the school building board for the information and guidance of all students enrolling in either ground or flying courses.

Sec. 4. Suitability and Surroundings of the Equipment

A. Licensed Equipment: All planes and fuel light instruction in an approved school shall be placed beyond the Department of Commerce for that purpose.

B. Field Equipment: The minimum land field shall be one having at least 2,000 ft. of effective landing area in all directions, with clear approaches, or it shall have landing strips not less than 300 ft. wide, permitting landing in at least eight directions at all times, the landing strips and its cross or oblique angles less than 40 deg. nor any one of the landing strips to be less than 2,000 ft. in effective length, with clear approaches, or it shall have two landing strips, one aligned with the general direction of the prevailing wind, extending at least four-way landing at all times and having clear approaches; the landing strips to be at least 500 ft. wide and not less than 3,000 ft. in effective length and not to cross or converge at an angle of less than 60 deg. The dimensions of the effective landing area and the effective length of the landing strips shall be measured at altitudes above 1,000 ft. in accordance with accepted practice.

C. Hangar and Shop Facilities: There shall be hangar space sufficient to house all airplanes used for instruction purposes, and sufficient equipment and personnel to maintain such airplanes in an airworthy condition as required by the Air Commerce Regulations.

D. Number of Planes: The total number of planes equipped in actual instruction from a given field shall not exceed ten planes per hundred acres at any one time. The entire field should be available for take-offs and landings. Operations shall be limited solely to instruction during instruction periods where ratings may only be available.

E. Number of Students Per Plane: Not more than three students shall be enrolled in flying courses for each airplane normally available for flying instruction purposes.

F. Classrooms and Ground Course Facilities: Schools approved for ground instruction shall be equipped with one classroom for each hundred students enrolled capable of seating twenty students. The classroom shall be furnished with suitable classroom equipment and facilities. Where the ground school is not under the management of or associated with the flying school they shall have at least three types of aviation engines in current use and three types of engines airplanes for demonstration and practical experience purposes. The same requirements shall apply when the ground and flying school are combined if the repair shops and flying equipment do not affect the above required minimum.

Sec. 5. Competency of the Instructor

A. Flying Instructor

(1) Rating: All flying instructors shall hold a rating from the Department of Commerce as flying instructors before being permitted to give instruction in approved schools. Flying instructors ratings may be issued to the transport pilots who apply for such rating and who satisfactorily pass the following tests: (1) Flying Instructor's Flight Test, (2) a practical and theoretical examination on the explanation of flight maneuvers. The minimum passing grade in each subject covered shall be 70 per cent.

(2) Duration and Renewal: A flying instructor's rating will run continuously until his transport pilot's license, and may be renewed annually upon satisfactory evidence that he has served as a flying instructor in an approved school for not less than 100 hours in dual instruction during the past year. The Secretary of Commerce may, in its discretion at any time require the holder of such rating to undergo a re-examination in any of the theoretical or practical tests prescribed for original rating.

(3) Restrictions: No flying instructor shall be allowed to exceed six hours of dual instruction per day, nor shall he give flying instruction more than five days per week. The school shall be responsible that the efficiency of the instructors is not required by continued dual instruction at or near the minimum daily allowable time.

B. Suspension and Revocation: Flying instructor's ratings may be suspended or revoked for—

(1) Violating any provision of the Air Commerce Act of 1926 or the Air Commerce Regulations. (2) Carelessness or inattention to duty, or any demonstration of incompetency. (3) Doing any act which would involve the suspension or revocation of the holder of pilot's license, as provided by the Air Commerce Regulations.

C. Ground Instructors

(1) Rating: All ground instructors before being permitted to give instruction in approved ground schools shall hold a rating from the Department of Commerce as Ground Instructors. Ground instructors ratings may be issued to those qualified to instruct in one or more ground school subjects. The minimum passing grade in each subject covered shall be 70 per cent.

(2) Duration and Renewal: Unless sooner suspended or revoked, Ground Instructors ratings shall remain in force for one year from date of issuance and may be renewed on satisfactory evidence that the instructor has served as a majority of ground instructor

in an approved school for a period of time of not less than one-half the duration of his rating. The Secretary of Commerce may, in its discretion, at any time require the holder of such rating to undergo a re-examination in any of the tests prescribed for original rating.

(3) Suspension and Revocation: Ground ratings may be suspended or revoked for—

(1) Violating any provision of the Air Commerce Act of 1926 or the Air Commerce Regulations, or the Air Commerce Regulations. (2) Carelessness or inattention to duty, or any demonstration of incompetency. (3) Doing under the influence of or using, or being in possession of intoxicating liquor or habit forming drugs while on duty. (4) Refusal to exhibit rating upon proper demand. (5) Making any false statement in application for rating or in any reports required by these regulations.

Sec. 6. Adequacy of the Course of Instruction

A. Credit for dual time: When a student applies for license as a graduate of an approved school such graduate may be privileged to count a portion of his dual and check time toward the solo flying experience required for Department of Commerce license subject to the restrictions later set forth in Sec. 6-H of these regulations, provided he applies for license within 30 days from the date of graduation.

B. Time Limits of Course: The entire course, both ground and flight, shall be completed within a minimum length of time from the receipt of application, lasting three months for Private School, six months for Limited Commercial School and eighteen months for Transport School. There shall be a regularity of procedure of instruction, both ground and flight.

C. Records and Reporting: Each flying instructor shall keep an adequate individual record of each student which shall include a chronological log of all instruction both ground and flight, the entire record to be certified to by an authorized officer of the school.

D. Examination: Upon completion of the course in each ground school subject the student shall be given an examination on the subject matter covered and all grades obtained in all examinations shall be made a part of the student's individual record.

E. A complete review of all flying school and ground courses shall be authorized and approved by the Department of Commerce.

(4) A monthly report shall be submitted to the Department of Commerce by the School Director. The total number of students enrolled, with a chronological log of all instruction given each student in both flying and ground courses, the names of all graduates, the names of all students dropped from enrollment with the reason therefor.

(5) Standards: (1) The school shall maintain a standard of ground and flying instruction to assure that nine out of ten graduates who apply for license satisfactorily pass the Department of Commerce tests. (2) The school shall maintain sufficient personnel and equipment to insure that the student will complete the course within the prescribed time limits. (3) The school shall maintain such standard that 60 per cent

of the students accepted for instruction programs from the course, for which they have enrolled, exclusive of removal for due cause.

F. Restricted Courses. An approved school will be privileged to give restricted courses in both flight and ground subjects for the purpose of qualifying pilots who already have had the necessary total flying time for the grade of license for which they intend to apply. Such pilots shall be subject to the same guarantee to the Department of Commerce as licensees are.

F. Dual Instruction Restrictions. All dual instruction shall be around the airport area and no cross-country shall be counted as dual.

G. Solo Instruction. All students shall be given instruction in the recovery from stalls and spins prior to first solo.

H. Minimum Curricula Requirements

(1) Private Pilot Flying School

Flying Time.—The school shall give the student a minimum of 18 hours total flying time, of which 10 hours shall be dual and 8 hours solo.

(2) Limited Commercial Pilot Flying School

(a) Flying Time.—The school shall give the student a minimum of 30 hours total flying time, of which not less than 15 hours nor more than 25 hours shall be dual and check time, and as such be counted toward the solo flying experience required for Limited Commercial license.

(b) Experience on Various Types.—Each graduate shall have a minimum of two hours solo experience in flying each of two distinct types of planes other than those used for primary dual instruction, one of which shall be a cabin type.

(3) Transport Pilot Flying School

(a) Flying Time.—The school shall give the student a minimum of 200 hours total flying time, of which not less than 35 hours nor more than 50 hours shall be dual and check time and as such be counted toward the solo flying experience required for transport pilot license.

(b) Experience on various types.—Each graduate shall have a minimum of ten hours solo experience in flying each of two distinct types other than those used for primary dual instruction. He shall also have ten hours solo on at least one type of cabin plane which shall be not less than a 4-place type and which shall be loaded to normal capacity during these prescribed flights. He shall also have ten hours solo experience in flying.

(4) Private Pilot Ground School

Minimum required subjects and division of time.
Aviation subjects including principles of internal combustion, carburetion, cooling, lubrication, ignition. 30 hr.

Airplanes, including history of aviation, theory of flight, construction, construction, rigging, maintenance, repair. 30 hr.

(5) Limited Commercial Pilot Ground School

Minimum required subjects and division of time.
Aviation subjects, including principles of internal combustion, carburetion, cooling, lubrication, ignition, construction, various

types, inspection, maintenance and repair. 25 hr.

Airplanes, including history of aviation, theory of flight, construction, aerodynamics, construction rigging various types, inspection, maintenance and repair. 35 hr.

Aerial navigation and meteorology. 15 hr.

Shop Practices. Five hours each of the above required 15 hours on airplanes and on engines may be shop practice on the basis of three hours shop practice equivalent to one hour of classroom instruction. Shop practice shall be under the direct supervision of a ground instructor.

(6) Transport Pilot Ground School

Minimum required subjects and division of time.
Aviation Subjects. 5 hr.

Engines including principles of internal combustion, carburetion, ignition, lubrication, cooling, aviation types, construction, inspection, maintenance and repair. 25 hr.

Airplanes, including history of aviation, theory of flight, construction, aerodynamics, construction, rigging, various types, inspection, maintenance and repair. 30 hr.

Meteorology. 15 hr.

Aircraft instruments, radio and its use in navigation, parachute, its use and use. 10 hr.

Shop Practices. Ten hours of the above required 25 hours on engines and 10 hours of the above required 30 hours on airplanes may be shop practice on the basis of three hours shop practice equivalent to one hour of classroom instruction. Shop practice shall be under the direct supervision of a ground instructor.

Sec. 7. Grounds for Suspension or Revocation of Approved School Certificate

Approved School Certificate may be suspended or revoked for—

(a) Violating the Air Commerce Act or the Air Commerce Regulations or any of their regulations.

(b) Failure to make proper and seasonable reports.

(c) Making false statement in application or in connection with applying for certificate, or in any report required under these regulations.

(d) Using or displaying this certificate for fraudulent purposes.

(e) Refusal to submit to inspection upon proper demand.

(f) Making or permitting any false or misleading statements in advertising pertaining to the school.

(g) Failure to provide sufficient equipment and personnel to make it reasonably certain and entirely possible for any and all students to complete the course within the prescribed time limits.

Sec. 8. Duties of Regulations

The Secretary of Commerce, the Assistant Secretary of Commerce for Aeronautics, or the Director of Aeronautics may waive any of these regulations when, in his discretion, the particular facts justify such waiver.



By JOHN T. NEVILL

AN ENTIRELY NEW and improved flying boat has been designed by James H. Eastman, president of the newly organized Eastman Aircraft Corporation of Detroit and was displayed for the first time at the recent All American Aircraft Show in this city. The craft, which is known as the "Sea Rover," is a three place, open cockpit.

The "Sea Rover" is powered with a 120 hp. Curtiss "Chieftain" engine and is designed as a sport model flying boat. This craft and another Eastman product, a four place conventional flying boat, designed along the same lines, recently powered and to be known as the "Sea Puma," are to go into commercial production immediately according to the company's present plan. The "Sea Puma," however, will be of the convertible type, so that it may be used as either an open or a cabin craft.

Engineering work on the company's latest product was done by Mr. Eastman and his assistant engineer, Fred C. Wheeler, who has had seven years' experience designing flying boats. Captain Carl B. Super, Michigan National Guard pilot, is submanager and chief test pilot. The company is incorporated under the laws of Michigan with a capitalization of \$150,000. Besides Mr. Eastman, other officers are: G. E. Reichel, vice-president; LeRoy J. Gilbert, secretary; and Andrew G. Schell, treasurer. Directors, in addition to the officers, include John G. Pezzini, J. L. Thompson, and Archibald H. Jones.

Probably the most noteworthy features of the business "Sea Rover" are the dihedral tail, the simplicity of design as compared with many marine type aircraft, and the European type spouson rigging the hull.

The "Sea Rover" has a gross weight, fully loaded, of 2,800 lb. With the Curtiss engine, the craft has a top speed of 120 mph., a cruising speed of

90 mph., and an estimated rate of climb of approximately 1,000 ft. per min. and landing speed of 45 mph. The cruising range is 600 mi.

Construction of the Sea Rover's wings follows conventional practice. A Clark V airfoil section being employed. Span of the upper wing, which is built in two parts, is 30 ft., including 2 ft. 4 in. on width of the center section. The lower or stub wing, span is 20 ft. 8 in. The upper wing has a dihedral chord of 3 ft. 6 in. and the lower one a similar plan form and a 2 ft. chord including the ailerons. The upper wing has an area of 194 sq ft. and the lower 62 sq ft., making a total wing and aileron area of 256 sq ft.

Box type spruce wing spars, with Haskelite diagonal panel bracing are used throughout and strengthened where 8 ft. struts are attached. Haskelite panel bracing is also employed on the drag struts which are of the spruce box type. Front and rear spars in the upper wing are located



Plan and profile drawings of the Eastman flying boat

18.45 per cent and 65.0 per cent of the chord from the leading edge, respectively. In the lower wing the front and rear spars are located 15.28 per cent and 65.38 per cent of the chord from the leading edge, in the outer margin. Distance between spars is 34 in. in the upper wing and 18 in. in the lower.

Warren truss type ribs and single drag bracing with

MacWhirter, and of various sizes complete the principal members of the inner wings. The wings, however, are wired for lighting and the last is equipped with main wing lights. Both the leading and trailing edges of both wings are covered with duralumin. The latter covering used is Fischer, which is finished with five coats in Nitro lacquer.

The "Sea Rover's" upper wings are attached to the outer struts with two $\frac{1}{2}$ in. bolts, the lower wings being attached with two $\frac{1}{2}$ in. bolts through frames in the hull. Both wings are set at a dihedral of 15 deg. and an incidence of 5 deg., with a stagger of 20 in. The gap is 52 in.

Interplane struts are of 31 type chrome molybdenum steel tubing, fitted with both aluminum sheet and fabric. The struts, constructed of welded aluminum, inter-braced, and having a displacement of 3 in. are attached directly below the point of attachment of the interplane struts. This point on the lower wing is 36 in. from the tip.

The upper wing is designed to carry 80 per cent of the load. The load factors are those the requirements of the United States Department of Commerce.

The outer series of the "Sea Rover" is constructed of chrome molybdenum steel tubing and is designed to carry the hull, engine, upper wings, gasoline, oil and Heywood starter tanks. It is entirely covered in. The special aluminum mounting for the "Challenger" engine is employed. Engine vibration is absorbed by rubber blocks mounted in the mounting rig. The engine is fed by gravity through 3 in. copper tubing from a 15 gal. fuel tank. A six gallon oil tank, with one gallon reserved for air space, is provided.

A FURTHER feature of the hull is of duralumin, and with the rubber, constitutes the 25 ft. overall length of the boat. Maximum width of the hull is 40 in. Spanwise extending along the forward half of the hull on both sides are of the latest European design, built up as separate units, and mounted directly to the hull by means of duralumin bolts. This system is similar to that utilized by the Dornier and Supermarine leaders of the navy, and England, respectively, and is intended to throw the water behind and below the lower wing.

Left struts from the two spars of the upper wing, cross-ways in the hull are either not when they are attached at a point below the front edge of the lower wing, and above the spars. They are inter-connected through the hull by means of a single compression member. The hull is in the broken-deck type, the trunk being approximately half way between the forward cockpit and the propeller, and the difference in height between the upper and lower deck being six feet.

Tail surfaces are all of chrome molybdenum steel tubing and duralumin construction, and are attached to struts of the hull. In this particular the new craft differs widely from the greatest shown last year, the latter being of the cantilever and surface type. Horizontal tail surfaces have a total area of 43.33 sq ft. of which the horizontal stabilizer has 23.6 sq ft. The vertical tail surfaces total 14.8 sq ft., of which the fin is 6.46 sq ft. The fin is mounted on the top deck of the hull with four bolts, through the fin post, two in front and two behind. The stabilizer is hinged about the fin post and has an adjustment on the forward vertical member of the fin. It is supported by four struts, two on each side, the forward struts being adjustable.

Recesses are built in two halves, and joined at the

steering wheel, or horn. All control surfaces are operated by cables, and the rudder is the only balanced type control surface on the boat. The hull is equipped with a water rudder, which is operated by a cable and spring attachment on the larger rudder's control cable.

A Hamilton all-metal variable pitch propeller is mounted on the "Challenger" engine, and is equipped with a spinner.

The cockpit are air-tight, with almost dual controls mounted upon a single control column, in the star



The Challenger personal floatplane test in Lake

compartments. The forward cockpit is of sufficient width to be used by two persons if that is desired. Upholstery of the seats is similar to that in the British Scout "Colonnade," the leather, fitted with Kapek, representing virtual life preservers.

Instruments on the "Sea Rover" are of Pioneer, and include a magnetic compass, an altimeter, an air speed indicator, and oil temperature and pressure gauges. Gasoline is measured by a single magnetic sight gauge, located at the lowest point in the tank. A baggage compartment is located in the rear of the passenger compartments.

The "Sea Rover" is painted red below the spars, and a bright blue above. Wings and tail surfaces are of bright orange with blue struts.

Although a sailing craft has not, at this time, been definitely tried, the craft is expected to sell for approximately \$9,500.

The specifications according to the manufacturer are as follows:

Length	26 ft.
Span (upper wing)	36 ft.
Span (lower wing)	20 ft. 8 in.
Total wing and motor area	256 sq ft.
Upper wing area	194 sq ft.
Lower wing area	62 sq ft.
Stabilizer area	25.6 sq ft.
Elevator area	16.73 sq ft.
Fin area	6.46 sq ft.
Rudder area	8.34 sq ft.
Carburetor area	2,800 sq in.
Power Plant	Carburetor
Engine Rating	170 hp. at 1800 rpm
High speed	120 m.p.h.
Cruising speed	90 m.p.h.
Landing speed (estimated)	45 m.p.h.
Rate of climb (estimated)	1000 ft. per min.
Cruising range	400 mi.

A RECORDER for TESTING Shock Absorbers

By R. S. WAUGH

Manager, Aeronautical Division
Great Air Spring Company of America



DEVELOPMENT of an "impact and recoil recorder" for testing and recording the behavior of airplane shock absorbers under conditions corresponding to actual use has just been announced by the Aeronautical Engineering Company of San Francisco and the Great Air Spring Company of America, two whose engineering concerns constructed the first such machine.

The new device is the first ever constructed for such a purpose. It was brought into being by the need for some more adequate method of testing shock absorbers than that of dropping a fuselage with aluminum attached, a procedure (because under a prescribed load).

This method, while it insures that a shock absorber will be adequate to the task for which it was designed, gives no indication of the forces transmitted into the airplane fuselage by the shock of landing and no means of comparing two different types or sizes of absorber beyond that of measuring the deflection caused in each. Moreover, there is no method of measuring recoil accurately.

In contrast to this the new machine gives an accurate record of the total amount of deflection. By means of an auxiliary time-measuring device this can be used as a basis for determining the speed with which the absorber takes up a shock. Comparison between the record given by the machine when an absorber is being tested and with one made under similar conditions except that the absorber is absent gives definite information as to the proportion of the total shock of landing taken up

by the absorber and the proportion passed on to the fuselage structure.

Thus, engineers using the new machine are able to know definitely what to expect in the way of stresses in the fuselage members. Most important, they will know exactly how, exactly the forces are applied. Hence, they will be able to prepare adequately for the absorption of landing shocks without the addition of weight involved in over-designing construction.

The machine depends for its operation on the principle that the deflection in a spring is proportional to the force applied. In practice a known weight is dropped a known distance, thus developing a known kinetic energy. The deflection this causes in the spring is measured and translated by a calibration curve into conventional units.

The machine consists primarily of a vertical frame built with steel guides in which moves a platform to which the weights are secured by bolting. To this platform the absorber under test is secured in similar manner to that in which it is fastened into an airplane

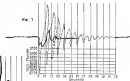
loading gear. To the absorber is fastened a conical hammer, the falling again being done at an accurate rate. The absorber is placed in a loading gear—by jigs, screw, bolt or otherwise as is appropriate.

This hammer, machined from cold-rolled steel and hardened, fits into a hollowed-out cap which is fastened to a vertical shaft. The hammer and cap are so designed that a constant impact is obtained. The shaft screws in a center about which are assembled, in order from the top down, an upper platform plate of cast steel, the main spring, a foundation plate of hot-rolled steel, a shock-spring and a capnut which holds the springs. Internal guide plates keep the springs centered. The shaft is free to move up and down through the foundation plate but the upper plate is fixed. The shaft is keyed to the foundation plate to prevent rotation.

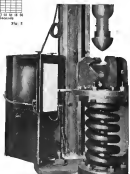
On the upper plate, surrounding and overlapping the edge of the impact cap, are four "dogs," which are pivoted on pins and held in the "over-lap" position by springs. Then when the hammer comes down and

in making a test, a known weight, varied according to the type of absorber being tested, is drawn to a predetermined length—forty-eight inches for a light plate absorber, more for a heavier one as determined by the weight being used and current testing practices. By means of a trip-hook this is released, carrying down the shock-absorber with its attached hammer. The drop engages the hammer and the energy of the falling weight is transmitted to the spring, causing deflection downward. The indicator pencil accordingly draws a downward sweep in the timing line.

The second spring, beneath the foundation plate, checks the rebound which normally would result. The recorder, of course, shows all the vibrations in position of the platform—that is, exactly what the

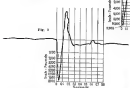


Timing of impact and recoil secondary, showing influence of mass increase on rate, rate, frequency and drop



Mass of absorber, lb.	Fig. 1	Fig. 2	Fig. 3
Weight drop, lb.	20	20	20
Weight drop, lb.	100	100	100
Weight drop, lb.	1,000	10,000	10,000
Mass of absorber, lb.	100	10,000	10,000
Mass of absorber, lb.	100	10,000	10,000

Weight drop, lb.
Mass of absorber, lb.
Weight drop, lb.
Mass of absorber, lb.



strikes the top the dogs engage a lip on its edge and so lock the absorber to the spring unit.

The recording device is connected to a welded steel stand inside the spring unit. It is a roll of paper is drawn from an take-off onto a drum which is rotated by a ground-down electric motor operating off the light circuit. A constant pendulum makes electric contacts, drawing a sweep through a magnetic coil and so causes the mass to be drawn to a predetermined extent according to the adjustment of the pendulum.

From the upper platform of the spring unit extends a rigid pointer, carrying a pencil which traces a line on the moving paper. This line reveals every shift in the position of the platform, vibrations downward showing the extent to which the spring is compressed and those above the mean showing the rebound.

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absorber does when subjected to the shock of the falling weight, while the breaks in the time line show when these things are done. From the complete graph the engineer, having knowledge of the initial force employed, is able to determine:

- 1 The proportion of the total energy taken up by the absorber.
- 2 Forces posed on it to the loading gear structure.
- 3 The equality with which these forces are applied.
- 4 The extent of the recoil shock.
- 5 The equality with which the absorber checks recoil.
- 6 The efficiency of the shock absorber as a whole.

Thus it is actually possible, with no other knowledge than that obtained by these tests, to say definitely that such and such a shock-absorber will be adequate for use on a given plane, that it will provide a smooth landing or that it will provide a safe (or unsafe) landing, with much or little bouncing after the plane is on the ground.

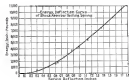
The device is also adaptable to the testing of automobile springs and shock absorbers.

In calibrating the machine some hundreds of tests were made.

A rigid tubing of corresponding length was substituted for the shock absorber and weights varying from 20 lb. to 500 lb. were dropped from heights of from three inches to twenty-four inches.

The records obtained proved to be typical damped oscillation curves. The maximum deflections shown by these were used as measures of energy to which the deflections are proportional. These deflections were carefully arranged and plotted to scale. The resulting curve of energy against deflection proved to be a perfect logarithmic function with exponent equal to 1.75 for the spring used.

In the testing of the shock absorbers, therefore, the recorded deflections, when interpreted through the



A graph of energy against the deflection of springs to determine the shock absorber testing spring

calibration, were true measures of the energy transmitted by them. The difference between the value and the total kinetic energy of the falling weight was generally the energy absorbed. In the types of absorbers so far tested, the efficiency of the shock absorber was about 75 per cent.

The oscillations in these cases were practically damped out in one cycle, due to the action of the steel

The loading machine designed to produce conditions in shock absorber similar to those created by the strike of plane

check, the entire movement becoming imperceptible in 0.5 sec. In contrast to this, the undamped oscillations recorded in the calibration test were plainly perceptible through twenty cycles and lasted through three seconds.

When the impact machine had been perfected, it was necessary to find means of producing, in the absorbers to be tested, the same conditions produced by the weight of an airplane landing as theirs. Otherwise, the tests would be representative of the absorbers alone and not of their action on these airplane releases to a plane.

As the absorbers chiefly intended for test were air seats, this could not be a device in which these seats could be released to the exact point representative of their condition under the static load of an airplane. For this, a landing machine was devised, consisting of a frame, two levers connected by a spring balance and the necessary devices for fastening the absorber between the levers, at its proper extension. When its arm has been fixed in position, an air introduced into the spring balance shows the condition in the case as if an airplane were being supported by the absorber.

The "airline" seat is then ready for testing and is placed in the exact position. The landing machine is unscrewed of air, a prepping rod and other types of shock absorbers for testing as well as the arm for which it was primarily designed.

The two machines together comprise a testing laboratory equipment with which it is planned to carry on extensive research into the efficiency of various absorbers, the results of which, in the form of engineering data, are to be given to the aerospace engineering profession.

More Airports Reported Building

Improvements Being Added at Many Fields

In the grand process of transportation progress one of the most widespread of presently active is the airport construction and development. According to the proposition that progress in the air is a great extent depends upon the quality of the facilities on the ground, cities, towns and counties are going along with extensive airport projects which are destined to play an important part in the country's social operations.

The West side of Leavenworth-Leno Valley is being surveyed for the installation of a common airport. 200 ft. wide and about 1,000 ft. long, partly for use of existing planes and partly for use of jets. Plans are being drawn for a \$750,000 group of headquarters buildings and hangars for the Thirty-6th Division Air Service there also.

Be Ready Naval Facility

Existing facilities for naval aviation carriers are to be included in the facilities at the Baltimore, Md., Municipal Airport. Improvements of Long Field, Baltimore, which is to be used as a temporary air mail stop until the main port is in operation, is to be planned and installed. Under the agreement with the government the field was built by Airway.

A \$100,000 municipal bond election will be held this month at Address. Two projects to making use of the municipal airport for a municipal field. Work is going ahead on the \$100,000 airport at Chicago for the Chicago Village Airport. The installation of a new airport project will be an expenditure of \$250,000. The field is located near Glenview and covers 450 acres. A total of about 3,000 acres in the 150-acre lot is proposed at a new St. Louis Municipal Airport project. City leaders are considering the feasibility of this scheme at the present time.

Building New Air Port

New airport projects include plans at Jersey City Airport Project, New Jersey, N. Y., commercial airport. Both in Denver, N. Y., Indianapolis, Ind., Burlington, Iowa, Colorado, Colo., Plant City, Fla., Alamosa, Colo., Jacksonville, N. C.

At Alamosa, N. C., work is well under way on a 300-acre field leased by the Carson Flying Service, Inc. A hangar 100 ft. x 100 ft. will be built and a restriction order is to be established at the field with a maximum load and maximum personnel limits. About \$100,000 will be spent on the field this year. A well-lighted and modern airport is planned. Dixon, Ill., by Chicago R. R. is being built at the Chicago R. R. Airway, level of air, one more station. Among the improvements improvement projects underway are the following:

- Rockwell, N. Y. \$150,000 for the construction of a hangar and 1000

mile of runway; Springfield, Mass. Airport Corporation, legislature money, building large hangar and installation of lighting; Springfield, Mass., \$12,000 for the construction of a high way to Boston Airport in Newbury, N. Y., construction of runway, installation of lighting and construction of a hangar.

In the Midwest field there are the following projects:

- Des Moines, Iowa, Des Moines Flying Service of Michigan is building two hangars at the Grace Air Airport at Kansas City, an air-mail passenger station is to be built at Norfolk-13, construction will start soon in the Chicago R. R. project, the Chesapeake Annapolis Club of Cleveland is building at Detroit a terminal for passengers and cargo between the two cities. Completion of lighting at the Riverdale, Ind., airport is expected soon.

A ramp for amphibious planes is to be built at Milledale Airport, Massachusetts, while at Chicago Municipal Airport the new N.E.T. 100 ft. x 100 ft. hangar has been completed. Other projects include new buildings at the Dallas, Tex. Municipal Airport, new hangars at the Denver, Colo., Municipal Airport, and operations and fuel facilities at the Longmont, N. M., Airport. Another hangar for Boeing Air Transport is being built at Oakland, Calif., and a facility for upgrading the Portland, Ore. Municipal Airport is being installed.

F.A.A. Cuts 3,255 Positions

NEW YORK (AP) — At an average of 40 days, the American Airlines will be cutting 3,255 employees over the next 18 months, according to a report from the Federal Aviation Administration. The report says that the airline industry is facing a "severe" recession and that the FAA is cutting 3,255 employees over the next 18 months. The report also says that the FAA is cutting 3,255 employees over the next 18 months.

Orange Colored Clothing Required

KANSAS CITY (AP) — Kansas City's new airport is to be built with orange-colored clothing required for all personnel working on the site. The purpose of the color clothing is to make the men more conspicuous to pilots coming in to land at the field according to W. S. Spencer, field manager. The color clothing will be orange.

Pitcan Names Advisory Council

PHILADELPHIA (AP) — An advisory council has been appointed by the Port of Philadelphia to advise the port on the construction of a new airport. The council will be made up of representatives of the city, the state, and the federal government.

The council, headed by Mayor Frank R. Lautner, will be made up of representatives of the city, the state, and the federal government. The council will be made up of representatives of the city, the state, and the federal government. The council will be made up of representatives of the city, the state, and the federal government.

New Yorkers Form Communist Service

NEW YORK (AP) — New York and Southern Air Lines has been announced here by David H. Cox, of the existing routes of Cox & Stevens, in connection with the new line of regular and charter trips during the summer between New York and Washington, D. C., and to Havana and other points in the West Indies. The new line will be operated by the New York and Southern Air Lines.

The planes will be at Flushing Bay where a ramp and hangar are being built by the New York and Southern Air Lines. The planes will be at Flushing Bay where a ramp and hangar are being built by the New York and Southern Air Lines.

Coastal State Service May 6

ALBANY (AP) — Coastal Airways will inaugurate its new York-Albany airplane passenger service on Monday, May 6, with three Fairchild twin-engine aircraft. The service will be operated by the Albany-Albany Airways. The service will be operated by the Albany-Albany Airways.

P.A.A. Defends Position in Dispute

WASHINGTON (AP) — The American Airlines on April 29 said a brief with the Port of Philadelphia claiming the right to carry out the terms of the contract for development of the Canal Zone—Chile, air mail service, which it was granted in March. The inauguration of the line, scheduled for April 4, will be held up pending a decision on the part of the American Airlines. The American Airlines is the owner of the line. The American Airlines is the owner of the line.

Government Reports Progress on Airways

WASHINGTON (AP) — A survey on civil aviation throughout the United States in advance, government survey officials report that the Department of Commerce, April 29, reports are complete on two survey teams, the aerial survey of another section has been finished, and work on most others is going forward rapidly. The survey of the Atlantic Ocean section and the Pacific section are being completed. The survey of the Pacific section is being completed. The survey of the Pacific section is being completed.

Vacant Lot on Damages

ALBANY (AP) — Governor Rockefeller has asked the State to take action to clear the vacant lot on the site of the old airport. The lot is located on the site of the old airport. The lot is located on the site of the old airport.

St. Louis Seeks New Mail Line

ST. LOUIS (AP) — A delegation of members of the Air Mail of the St. Louis Chamber of Commerce will visit Washington this week to urge the establishment of a direct St. Louis-New York air mail route.

W.A.E. Offers Excursion Rates

DENVER (AP) — Western Airlines rates on the Cheyenne-Pueblo branch of the Western Air Express are being offered by the company in order to help the company's third anniversary. Rates from Denver to Colorado Springs are \$6.00, to Pueblo, \$8.00, to Cheyenne, \$10.00. Cheyenne to Colorado Springs is \$10.00 and to Pueblo is \$12.00.

S.A.F.E. Plans Line to Detroit

ST. LOUIS (AP) — Southwest Air Express team will inaugurate a St. Louis-Detroit line, using 140-passenger jet in expanded Ford Mustang, sound in the offices of the Western Air Express. The line will be operated by the Southwest Air Express. The line will be operated by the Southwest Air Express.

Wisconsin May Get More Mail Lines

MILWAUKEE (AP) — Examination of the mail line in Wisconsin is in progress, following a referendum in the state of the Wisconsin Chamber of Commerce. The examination is being conducted by the Wisconsin Chamber of Commerce. The examination is being conducted by the Wisconsin Chamber of Commerce.

Two plans were discussed at the meeting of the Wisconsin Chamber of Commerce. The plans were discussed at the meeting of the Wisconsin Chamber of Commerce. The plans were discussed at the meeting of the Wisconsin Chamber of Commerce.

Makes Air Express Continue

CHICAGO (AP) — A contract agreement developed for Chicago by the Chicago Chamber of Commerce is being developed by the Chamber Corporation of America, one of the leading manufacturers of all kinds of wood and glass shipping containers in the country.

Chadbourne Aircraft Plans Line

LOS ANGELES (AP) — Chadbourne Aircraft Company is planning a new line of aircraft. The company is planning a new line of aircraft. The company is planning a new line of aircraft.

Air Line Concerns Boys Fought Machine

NEW YORK (AP) — Boys Fought Machine, which is being proposed to use for the New York-Vietnam flight, is being proposed to use for the New York-Vietnam flight. The machine is being proposed to use for the New York-Vietnam flight.

American International is going ahead with preliminary arrangements for operating along the North American route, and it is said to have reached a cooperative agreement with the airline. The agreement is being reached with the airline. The agreement is being reached with the airline.

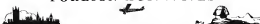
Universal Changes Schedule

MENAPOLIS (AP) — Changes in schedule for the Chicago to Boston passenger line of Universal Air Lines is to be made direct connection with the Chicago to Boston passenger line. The changes are being made with the Chicago to Boston passenger line.

Seeks Denver-Kansas City Line

KANSAS CITY (AP) — United States Airways, Inc., has been organized to operate a passenger, cargo and mail service between New York, Denver, Kansas City and Chicago. The company is being organized to operate a passenger, cargo and mail service between New York, Denver, Kansas City and Chicago.

FOREIGN ACTIVITIES

Interceptor Adds
To Control During Stall

LONDON (REUTERS)—The "interceptor," a device designed to supplement the already fully automatic, also recently was demonstrated at the Croydon model Aerodrome. The device appears to successfully accomplish the function of giving any powerful lateral control to an airplane in a stalled condition. It is an electric aid, it is reported, that the lateral control during the stall remains practically the same as under normal flight conditions before the stall occurs.

In effect it gives one way faster than the automatic aid. This latter mechanism was designed, of course, to eliminate the spin hazard and give an appreciable degree of control during a stall. This method in practice is more or less sluggish. The interceptor appears to remove the deficiency and apparently provides perfect control under stall conditions, while the automatic aid would be dangerous.

The mechanisms are shown which normally fly flush with the surface of the air wing just behind the stall. They are controlled by rods to the ailerons and have no connection with the stick. It is so arranged that the downward movement of the ailerons has no effect, but as extensive upward movement of the ailerons is made, the plane actually rises to a specific position. This serves to spot the efficiency of the air on the wing. As the plane rises the ailerons adjust in the downward position and both the ailerons and the stick are then again neutralized. In the demonstration a Moth was used and the ease with which it was maneuvered under apparently perfect control, even into steep banks, was ascribed to provide a very convenient demonstration of efficiency.

May Exhibits at Montreal

MONTREAL (CANADA)—Thirty-eight exhibitors, offering all available space, will take part in the annual annual air show here May 4 to 11 under the auspices of the Montreal Little Aero Club. Exhibitors for Canadian, English and American countries are represented in the list of participants displaying planes, accessories and transportation exhibits.

Soviet Glider Atlantic Walk

BERLIN (GERMANY)—Glye Krowitz, a Warsaw pilot, established an altitude record for gliders April 22. He was accompanied by two other pilots. The former record was about 6,500 ft. His track took him a circuit in the Rhine district.

English Distance Plane Falls

KARACHI (INDIA)—The Pioneer-Norac new type military transport landed here April 25 in the attempt to fly from London to Singapore, a distance of 13,000 miles, or 1,000 miles as measured over the great circle course. Bad weather forced the aircraft to land here after completing about 4,150 miles of the distance. While taking to make a new distance record, the aircraft took on the British Empire without the necessity of landing for refueling on foreign soil.

France Buys Short Calcutta

PARIS (FRANCE)—In accordance with its newly authorized policy of purchasing foreign aircraft with which to supplement its colonial defenses, the French government has ordered a Short Calcutta six-engine 14 passenger flying boat from England. Further action hangs on the results of operation of this machine. It is expected that eventually the type may be built in France under license. A previous license order has been given to the Fokker works of Holland.

Canadian-Built Picks Branch

SAINT JOHN (N. S.)—Mr. S. Lightfoot, representative of the Canadian branch of Montreal has announced here that Saint John had been picked as the location for a Maritime Province assembly plant and that it would be operated by his company. He is now looking for a temporary building to use until the company can get its better place. They will assemble the first Bomber and other certain parts for which Canadian-built has the Canadian license, he said.

Schneider Event to Attract Many

LONDON (REUTERS)—The Royal Aero Club is expecting several hundred planes will be displayed at the start of the Schneider Cup race over the Solent in September and is making extensive preparations for handling these. Accommodations for about 250 probably will be arranged at Gosport and about the same number at Thistle Island.

Record Claimed for Halsebach

BERLIN (REUTERS)—A. Halsebach, a German pilot, set a record on April 23 of about 7,218 ft. with a weight of 15,750 lb. Claims for recognition of this as a world record have been submitted to the F.A.I.

Foreign News Briefs

Toronto and Windsor, Ont., are to be linked by an air-rail service. The Spanish Ministry of Aviation has requested 2,500 new planes to improve the country's air transport system. The air force is reported experimenting with a new military motor on the Diesel principle.

International Airways of Canada will operate a seasonal passenger service between Montreal, N. B., and Charlotte, N.C., from October 1st.

The Handley Page bombers in England has received an order for a fleet of planes powered with four engines and carrying 40 passengers in addition to a crew of three.

An extensive set of exhibits displaying various aspects of European armaments were exhibited in the aviation section of the Exposition Palace at Geneva, April 27 to May 3.

The D. H. Mohr is to be bought by the Canadian National Defense Department at an estimated cost of \$28,000 for use by the St. John's N. S., Sydney, New Scotia, and Kingston and Port William, Ont.

An aerial photograph at the West-Whitby Building, New York City, takes on the meaning that Lockheed and Lockheed are in Germany, near the capital of honor at the International Exhibition of Aeronautics at Cologne. It was taken by a B. A. Smith of the British Aerial Services as an altitude of about 1,700 ft.

The British Air Ministry has agreed to assist the Handley Page ship to carry aircraft for a reconnaissance of \$200,000.

The French Air Union opened its night air service between Paris and London on April 5, the plane leaving Paris at 11:15 a.m. and arriving at Croydon at 4:08 a.m. The August Air Union plan to open similar service between London and Brussels.

Spanish Airlines celebrated its fifth birthday April 1. During the last four years there has been no accident involving its planes in any form of passenger plane as yet.

An Armstrong-Siddeley transporter of Imperial Airways, carrying 10 passengers and a crew of three, recently flew between London and Paris in an hour and 40 minutes.

The trip from France to India comes in which both Cote and Lockheed were completed by three French aircraft. The flight was completed in 7,000 miles in 10 days.

China is reported to have ordered two new models from the DeLaval-Lund company.

THE BUYER'S LOG BOOK



Stanley Electric Drills

TWO new electric drills have been placed on the market by the Stanley Works, New Britain, Conn. One of these drills is designed for a specific purpose while the other is adaptable to a variety of uses.

The first, a heavy duty electric drill, which has been designed especially for driving cylinder bores, embodies the general characteristics of all Stanley drills. The tool



The Stanley new tool has standard duty electric drill

is of sound design having a minimum of projections and hollows to collect dirt and grime and is of extremely light weight for its rugged construction. An especially designed ventilation system keeps the tool cool under the heaviest working condition.

The motor, having ample reserve power and the spindle shaft supported by three ball bearings on each end,



The three-quarter inch heavy duty Stanley drill

take care of the push and pull thrusts encountered in boring. These ball bearings constitute the best known method of supporting the spindle shaft according to the manufacturer. They require no adjustment and eliminate entirely the chance of wobbling and shaking.

The first, standard duty electric drill combines all of the features of Stanley drills. This tool has a ball bearing supported control knob, three ball bearings on spindle and a motor having ample reserve power. A special chuck key holder in the gear housing keeps the key easily accessible and prevents loss.

Engelhard "Heliumometer"

A NEW instrument to measure the diffusion of helium gas has been developed by Charles Engelhard, Inc., 281 N. J. R. Ave., Newark, N. J., and is now available on the U. S. Navy drawing "Gas Analysis." The device has 14 gas chambers filled with pure helium.

There is a constant diffusion of the gas through the pores and valves, etc., the rate of diffusion governing the lifting power and the buoyancy of the gas.

The "Heliumometer," as the new instrument has been named, is provided with a scale range of 100 to 8 per cent. The instrument can be used also in the laboratory for rating diffusion rates on camera tubes, etc. On the top portion of the ball of the draught, top notch are available for each gas chamber. Samples are periodically taken out and if the water shows that the helium is (above) to a certain percentage, this helium is withdrawn and replaced with pure gas. The helium withdraws is released and used again.



A Heliumometer of the "Heliumometer"

Airport Sirens

SEVERAL types of sirens for installation at airports are offered by the Sirens Fine Alarm Company, 55 Allen St., Rochester, N. Y. These include the "Little Giant," Model M, and Code units.

Ordinary signals on the siren are sent by hand. With the Little Giant siren a remote control with time-out control station can be employed. For the model M siren a remote control of the same type can be used. To send any signal, the start button is pressed the siren blows for the desired period and the stop button pressed the operation being employed in this way adds the desired number of blasts have been sounded. For fire alarm purposes on the Little Giant or Model M siren, a time-out control box specially used may be applied. This box gives a succession of blasts in the siren for a predetermined period and automatically cuts out. The signal set-up of remote and automatic controls may also be used with control buttons and start buttons. For fog signals a special prearranged time-out automatic control is used. The Code unit, without the regular Code siren, cannot control being close from the press button in the Code control unit.

Thor Nut Tightening Attachment

A DEVICE to insure uniformity and accuracy in the tightening of nuts, has been designed and placed in production by the Independent Pneumatic Tool Company, 630 West Jackson Boulevard, Chicago, Ill. This device eliminates the uncertainty of relying on the experience of the operator as well as the usual additional hand operation for final tightening on driving nuts.

The Thor "Kick-out" Nut Tightening Attachment is provided with an auxiliary clutch which operates under spring tension when a certain torque is applied to the front end of the attachment. When the nut is driven to this tension, the auxiliary clutch disengages and lifts itself off on a pin which permits the front end of the attachment to remain stationary for one revolution before the auxiliary clutch is again engaged, during which time the operator has ample opportunity to pull the machine away from the nut.

The "Kick-out" attachment is adjustable so as to take care of a variety of sizes of nuts and bolts. The adjustment is very simple and can be done by anyone.



The "Kick-out" nut tightening attachment

who operates the tool. When the attachment is set and adjusted, every nut or bolt driven will have exactly the same pre-determined tightness, regardless of who is operating the machine.

The device is made in several sizes and will successfully drive any nut or bolt from 1/2 in. to 1 1/2 in. diameter. It is very simple in construction, and is enclosed by a sleeve extending over the two clutches which protects all moving parts from dust or grit. There are no wearing parts in the device and it will last for an indefinite time.

Although the attachment was designed especially for use with Thor high frequency (180 cycles) electric tools, it can also be had for use on Thor universal electric tools in various sizes.

"Super Master" Regulator

In order to meet the demand for a device to deliver gas at reduced pressures for welding and cutting operations, the Alexander Millers Company, 1416 West Baltimore St., Baltimore, Md., has developed the "Super Master" regulator.

The new regulator has been designed for use where a large volume of gas or a great number of outlets are to be controlled. By its use it is possible to deliver gas, which has been compressed in tanks to approximately 2,000 lb. per sq. in., at pressures ranging from several ounces to several pounds per square inch.



SIDE SLIPS

By Robert R. Osborn

We think we have discovered the height of something or other when we found that the lawless "Jerry" at Gates Field, the only ship on the field without hangar space in which to rest its weary head, is the property of "The Metropolitan Air Museum, Inc." This curiously takes the form of a checkbook away from The Society for the Promotion of Aerial Navigation by Airship, which was announced in Germany a year or so ago.

According to an interview with Lady Dreyfus-Roy, who accompanied the Graf Zeppelin on its recent Trans-Atlantic flight, the ship is going to make an around-the-world flight in July. As these flights are always for the purpose of "goodwill" visits between the nations' navies, we suggest the accommodation on board of one stowaway from each country touched during the flight.

"Over Lake Union, at Seattle, last week put-ported a great airplane; its propeller moved out, its engine was dead. Motor power came from a small outboard motor attached to the landing cabin, so to the rear end of a rowboat or canoe. Permanent utility of the outboard motor: the airplane can take to its dock without the great draft and ungainly power of its flying engine." From an article in "Time" magazine.

Finally this is a good idea, we're not an expert on airplane matters, but somehow this reminds us of the lady who discovered one day that her fountain pen would write just as well if she dipped it in an inkwell as she would an ordinary pen.

Our magazine is now offering a five-cent (5¢) flying course in personal aviation to certain subscribers of *aviation*. This announcement must have come as a terrible blow to the aero-lawyer industry.

A New York lady, usually prominent, recently signed up for a flying course at a local field and the *Times* reporter quoted her in an interview as follows: "I do not know war in the least, and hope there will never be another one, but I do believe in defense and preparedness," she declared. "I believe in the duty of every American woman and man who can pass the physical tests to learn how to fly. If there should be another war, women will be exposed to fly planes just as they drove motor cars during the last war." We had no experience with their driving at the last war, but if the war flying of the ladies should be anything like their peace time car driving we shall have achieved that desired condition of having war so dangerous that no nation would dare start one.

How MUCH DOES IT COST YOU TO TRAIN A PILOT?

Average Plane Used for Training 90 to 110 H. P.		Aeromarine Klemm AKL25 Monoplane 40 to 50 H. P.	
Hourly Operating Costs		Average Training Plane Per Hour	AKL25 Per Hour
1—Engine Depreciation			
(a) Sellsman ADS engine at \$1400 cost, 2000 Hrs. life			\$0.70
(b) Average 90 to 110 H. P. engine at \$1200 cost, 1500 Hrs. life		\$1.60	
2—Oil and Gasoline		\$3.90	\$1.60
3—Overhaul			
(a) Sellsman ADS every 300 Hrs. at \$150 cost			\$0.50
(b) Average 90 to 110 H. P. engine every 320 Hrs. at \$250 cost		\$1.00	
4—Instructor's hourly rate of pay		\$5.00	\$5.00
* Total Hourly Operating Expenditure		\$11.50	\$8.00

* Excludes airplane field school expenditures and the maintenance under which these figures are calculated. The above expenditures figure equals only the actual hourly operating costs. They do not include the initial cost of plane, no depreciation and engine overhaul, or reserves and advances for such items—cost of engine and training school overhead and transportation expenses.

YOU can't keep your school up—unless you keep your costs down. Your flying equipment may stand all tests for safety—but will it stand the test of making your school profitable? Training pilots is a business. It may be the work you like best—you may get a kick out of it—but unless it is commercially safe and profitable sound—it is headed for a crash—and with it your success and dreams of independence. The comparative figures above will stand the most rigid investigation. We're also that we are doing a daring thing in publishing

them . . . but the figures represent facts . . . facts that speak for themselves . . . facts that should prove tremendously important and profitable for you—whether you are now operating a school, or planning to do so. Eight years of the utmost popularity and success, as a training plane at home and abroad, on back of every statement made here about the AKL25. Its demonstrated economy of operation will help to make any school profitable. The AKL25, moreover, requires the minimum of maintenance. Write for literature.



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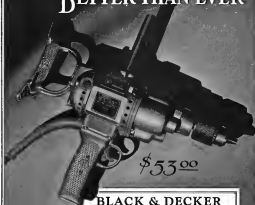
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WACO with the new J-6, 5 cylinder Wright "Whirlwind" motor... Brilliant performance with astonishing smoothness... Top speed of 125 and better... Excellent maneuverability... Exceptional climb... In and out of the smallest fields with ease... That's the WACO "165" Straight Wing. It's the airplane many have been waiting for.

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We are preparing a book about the formation of Flying Clubs. If interested, we suggest that you reserve your free copy now.



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The quiet of the closed-cabin Robin makes conversation easy, thus permitting student and instructor to ask and answer training questions in the air—where they count—this saves time and affords more thorough instruction.

Exclusive performance and economy of operation strongly recommend the Robin as the foremost closed-cabin training plane that is available today.



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Praeger: "Before buying a plane I want to make sure that I won't have trouble in getting expert advice as to just what airplane equipment and how can you get it?"

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Fred Foote of LIFE buys a COMMAND-AIRE

FOR some time Fred Foote, Co-Editor of Life, has been selling space on airplanes. We learn from the Time January 27th and said: "Goodness! Mr. Foote—give the boy a hand!"

Overnight Mr. Foote rises from the domain of selling space via plane to the super-domain of selling space on Command-Aire airplanes.

For Mr. Foote has just contracted for a Command-Aire equipped with a Wright J-6 150 H. P. motor and with all the gadgets and goodies which Command-Aire modification discards.

Command-Aire takes particular pride in Mr. Foote's purchase because it is a dis-

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It all started, doubtless, with the inherent mobility of Command-Aire—a mobility which, as the picture shows below, permits the pilot to leave the controls and stow the luggage while the plane flies accurately and unerringly forward. This is no mere boast but an everyday test of Command-Aire mobility.

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Out of the autograph book at the Verville Booth at the Detroit Show, we pick a few expressions about the Verville Air Coach:

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82% of all the Airplane Manufacturers, 42% of the Licensed Plans, 46% of the Engineered Aviation Mechanics and 81% of all the Plans in the United States are in this region. Every facility for the obtaining of materials and allied parts, and for their fabrication by men and machinery, is at hand. Concentrated at the center of a 500-mile radius, the resources of St. Louis are only five hours by air from nearly all this territory.

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Prevents Eye Strain

BECAUSE Lamoglas lenses, obtainable only in genuine Lamoglas goggles, have less light and cause less reflection than any other non-see-through lens made, the Lamoglas 44 prevents eye strain and helps you level off properly, in addition to protecting your eyes in case of mishap. That's why the Lamoglas 44 is the most popular goggle with experienced pilots. Lamoglas 44—the perfect vision safety goggle—is non-reflective, unbreakable, and windproof, with a soft sponge rubber banding which automatically fits the contour of the face—safe and comfortable. Price \$5.95.

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Write to order now of the Beckley Motor Store, 414 E. 4th St., St. Paul, Minn. Beckley Building, San Francisco, Calif. In Canada: Toronto Aircraft Ltd., 47 Jarvis Street, Toronto.



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It is the last Jaeger watch, Jaeger Instruments Ltd. Ltd. These watches are made in the finest of materials and are the best of the Jaeger line. They are made in the Jaeger line, and are made in the Jaeger line. They are made in the Jaeger line, and are made in the Jaeger line.

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B. G. MICA SPARK PLUGS
again showed their absolute

Reliability of Performance

The Transcontinental Race, Class A, B and C 1st, 2nd and 3rd places.

All the Closed Course Events with unassisted Winfield and Wasp engines.

11 out of 11—1st place
11 out of 11—2nd place
6 out of 6—3rd place

The Mitchell Trophy Race Class D-12 engines—1st and 2nd places.

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ALL WHEELWIND, WAPIS AND WINFIELD IN THE TRANSCONTINENTAL AND CLOSED COURSE WERE EQUIPPED WITH B. G. MICA SPARK PLUGS.



Send for a B. G. "Driver"

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